DIRECT TESTIMONY OF

ERIC H. BELL, P.E.

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC.

DOCKET NO. 2019-393-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is Eric H. Bell. My business address is 220 Operation Way, Cayce, South Carolina, 29033. I am Manager of Economic Resource Commitment for Dominion Energy South Carolina, Inc. ("DESC").

Q. BRIEFLY STATE YOUR EDUCATION, BACKGROUND, AND EXPERIENCE.

A. I am a graduate of the University of Texas with a Bachelor of Science degree in Electrical Engineering and am licensed in South Carolina as a Professional Engineer. Following graduation, I served in the United States Navy as a Nuclear Submarine Officer. In 1994, I began my career with DESC, then South Carolina Electric & Gas Company,[1] as Assistant Plant Engineer and in 1997 was promoted to Operations Planner. From 2001 to 2008, I engaged in economic resource

[1] In April of 2019, South Carolina Electric & Gas Company changed its name to DESC.

commitment and, in 2008, I assumed my current role as Manager of Economic Resource Commitment. In this position, I am responsible for managing and optimizing generation fleet operations to provide reliable, least-cost energy to DESC's customers. Among other things, my responsibilities include participating in fuel purchasing decisions, unit commitment, and the coordination of activities and system data with power marketing, transmission system control, maintenance scheduling, and natural gas supply. Since June of 2019, I have also been responsible for generation planning for DESC, which includes managing the development of the Integrated Resource Plan.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA ("COMMISSION")?

A. Yes, I previously appeared before the Commission and testified in Docket No. 2019-184-E, DESC's avoided cost docket.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to explain certain aspects of the tariff (the "Tariff") that DESC filed in this docket on December 30, 2019. The Tariff includes stated, fixed rates that DESC will pay to eligible qualifying facilities ("QF"), as defined under Public Utility Regulatory Policies Act of 1978 ("PURPA"). Specifically, I will explain how these values were developed and the key factors DESC considered in that development.

Q. WOULD YOU CONSIDER THE TARIFF A "STANDARD OFFER" FOR BATTERY STORAGE?

A. Yes. The Tariff contains standard terms and conditions and stated, fixed rates that eligible QFs (each, a "Storage QF") can receive by meeting the requirements stated in the Tariff.

Q. PLEASE STATE KEY SPECIFICATIONS TAKEN INTO ACCOUNT BY DESC WHEN DEVELOPING THE RATES IN THE TARIFF.

A. These specifications included things like maximum power output, maximum charge rate, maximum energy storage capability, roundtrip efficiency, degradation rate, dispatchability, and the size of the Storage QF relative to the size of the associated generating facility (each, a "Generating QF"). Not all specifications are requirements of the Tariff, but consideration was made for each. All of these factors can vary from project to project, but size and efficiency have the biggest impact on the potential value of each Storage QF to DESC's customers. To determine such value, capacity and energy-shifting must be studied and imputed for a specific Generating QF paired with a specific Storage QF. As such, Storage QFs must meet certain parameters provided in the Tariff to qualify for the Tariff. In this way, the stated, fixed rates in the Tariff closely approximate the value provided under the Tariff to DESC's customers.

Q. PLEASE EXPLAIN THE RATE STRUCTURE FOR THE TARIFF.

A. There are two rates which serve as the foundation of the Tariff: (i) Storage QF Capacity Rate and (ii) Storage QF Energy-Shifting Rate. I will explain each below—however, it is important to note that these two rates are inextricably linked.

Q. PLEASE EXPLAIN THE STORAGE QF CAPACITY RATE PROVIDED IN THE TARIFF.

A. The Storage QF Capacity Rate refers to the Storage QF's maximum power output and capability of the Storage QF to avoid future capacity costs. However, the Tariff mandates that a Storage QF must be able to deliver its full discharge capacity rating over most of its state of charge range when called upon in order to be considered sufficiently firm to receive a capacity credit. As DESC Witness Hanzlik explains in his testimony, there may be other system needs as well, but as a fundamental matter, it must be able to actually deliver that stored power to DESC during those peak times to provide that value. To assure this availability, the Storage QF must agree to comply with DESC's dispatch signals for charging and discharging to be eligible for the Tariff. The value paid for this availability is measured in terms of future avoided capacity costs.

In calculating that rate, DESC determined the capacity value a Storage QF contributes to a future winter peak reserve margin. Specifically, DESC used the capacity value established in Docket No. 2019-184-E (DESC's avoided cost docket) that was presented by Office of Regulatory Staff ("ORS") Witness Horii. In that docket, ORS Witness Horii used DESC's 2019 IRP Scenario 13 to establish system avoided costs for capacity based upon the next new resource. That value, based upon the winter peak avoided capacity cost, is $66,757.50 per MW. On a monthly basis, this avoided capacity value is $5.56/kW-AC-month. DESC utilized this rate as the stated Storage QF Capacity Rate for the Tariff.

Q. PLEASE EXPLAIN THE STORAGE QF ENERGY-SHIFTING RATE PROVIDED IN THE TARIFF.

A. The Storage QF Energy-Shifting Rate is an avoided cost rate that represents the value of receiving energy produced during lower-value times, placing it in a storage facility with some energy losses, and later dispatching most of that same energy to the grid during higher-value times. To calculate this value, DESC used PROSYM software to model the electric system and study the difference in operating costs with and without the storage resource. In this study, DESC used certain methodologies and assumptions that I highlight briefly below:

- DESC utilized an updated version of the 2019 DESC IRP Plan 7 for its base case.
- DESC ran PROSYM utilizing this base case without any storage and determined the annual production costs.
- DESC ran PROSYM utilizing the same base case, but this time included a model of a 100 MW storage facility with 4 hours of storage.

- DESC compared the two studies and determined the levelized annual production avoided cost savings due to the inclusion of 100 MW of battery storage and determined the variable cost benefit of the storage facility on a per MW basis.

Energy-shifting has been utilized to create value on the DESC system for years because energy-shifting was first implemented on the DESC system with the addition of Fairfield Pumped Storage Facility ("Fairfield"). Fairfield was designed to store energy produced in off-peak times and re-deploy that same energy during peak periods. This pumped storage facility has operated well over the past 40 years and consistently provided DESC's system with the benefits of capacity and energy-shifting.

Q. ARE THE RESULTS OF THE PROSYM MODEL FAIR TO THE STORAGE QF OWNER?

A. Yes. The PROSYM calculation is likely to result in an accurate value that removes risk from the Storage QF owner while providing appropriate compensation. The PROSYM model assumes Storage QFs are located on the grid and capable of receiving energy from the grid during daylight hours, which is different from Storage QFs that are tied to specific and energy-limited Generating QFs. Instead of having access to all energy on the grid, the Storage QF can only be charged by the on-site Generating QF. The result of this difference is that the PROSYM model reflects a dispatch optimization level that is higher than what is likely to occur, as discussed above. This difference is exacerbated with stated, fixed rates as the Storage QF becomes larger as compared to the Generating QF, which is why DESC imposed limitations on the size of the Storage QF in the Tariff. Similarly, if there were underlying performance issues with the Generating QF, these problems would be magnified given the assumptions that are built into the stated, fixed rates. That is also why the Tariff does not allow Storage QFs to satisfy underlying performance problems for the associated Generating QF. Much like the PROSYM model optimization, charging and discharging the Storage QF in real-time in response to system needs improves the Storage QF's ability to achieve a value approaching the facility's potential avoided cost. Regardless, the Storage QF owner receives certainty in the monthly payment representing that potential value to DESC's customers.

Q. PLEASE EXPLAIN HOW THE EFFICIENCY OF THE STORAGE QF AFFECTS THE VALUE OF THE STORAGE QF TO DESC'S SYSTEM.

A. Efficiency describes the amount of energy that can be extracted from the storage facility as it relates to the amount of power that went into the storage facility. Storage involves energy conversion and, due to the laws of physics, each conversion process results in energy losses and reduced efficiency. The following example describes how this efficiency measure affects a Storage QF's value. Consider two storage facilities that have the same power capacity and energy-storage capability, but different efficiencies. The higher-efficiency facility requires 105 MW of charging energy to return 100 MW of energy to the grid, while a lower-efficiency facility requires 118 MW of charging energy to return 100 MW of energy to the grid. The higher-efficiency facility has fewer losses in the energy conversion process and requires less charging energy to return the same amount of energy to the grid compared to the lower-efficiency facility. Therefore, the higher-efficiency facility should receive a higher energy-shifting value. However, with a stated, fixed rate, both will receive the same compensation because DESC assumed a 95% rate of efficiency in the Tariff design.

Also note that the concept of efficiency of the storage facility should be examined with the cost differential of other generators on the system to understand the true impact of the Storage QF. Both of these inputs will affect the facility's value as determined in a production cost model. As a general matter, when the cost of operating generation and incremental generation is similar, the value of shifting is low because the value is derived from moving energy from low-cost periods to high-cost periods. When there is a large cost differential between the lowest- and highest-cost generation, the value of energy-shifting is higher because the value is derived through reducing the cost differential and that reduction is enhanced by higher efficiency. Although these general concepts are true, to be accurately quantified, they must be applied to a specific system under a specified set of circumstances. Later in my testimony, I will explain how these concepts work with respect to DESC's system during summer and winter periods.

Q. PLEASE EXPLAIN HOW THE SIZE OF THE STORAGE QF AFFECTS THE VALUE OF THE STORAGE QF TO DESC'S SYSTEM.

A. The value of the storage facility's size depends upon the underlying rate structure. In the Tariff, DESC has two rates, both of which compensate the Storage QF based, in part, on the size of its facility. In general terms, the size of a Storage QF is defined by its maximum discharge capacity and energy-storage capability. Maximum power output or maximum discharge capacity is the sustained power the battery alone can supply to the grid. Energy-storage capability is measured in megawatt-hours and is the maximum amount of energy the battery can store and then deliver to the grid continuously over a fixed period of time.

Where capacity value is based on a fixed avoided capacity cost rate, energy storage value correlates directly with the utilization rate. A utilization rate is a measure of how much a storage system is being used and as a result, how much it reduces system operating costs. Just as a storage system with higher efficiency has less losses and a higher value, the storage system with a higher utilization rate will yield a higher value. However, internal factors such as available energy to supply the storage facility and efficiency, as well as external factors such as fuel costs and generator efficiency, affect utilization and energy-shifting value.

Q. PLEASE EXPLAIN HOW ENERGY STORAGE CAPABILITY AND ENERGY-SHIFTING, TAKEN TOGETHER, IMPACT THE VALUE OF THE STORAGE QF TO DESC'S SYSTEM.

A. To illustrate this point, I will explain how the difference in the size of two batteries impacts their relative value during the winter season. As an example, a 60 MW solar-generating facility produces on average about 260 MWh daily in the winter months (60 x 24 x .18), but its output can be as low as 86 MWh daily for several days in a row in the winter (60 x 24 x .06). These amounts are significant because they describe how much daily energy is available to be shifted. A 15 MW battery (a 25% or 60 MWh battery) paired with this same 60 MW solar-generating facility could be fully utilized on almost every day of the year since at least 86 MWh is available for charging on almost every day (which would be sufficient to fully charge the battery). Alternatively, a 60 MW Generating QF paired with a 90 MW Storage QF (a 150% or 360 MWh battery) would rarely experience a full discharge cycle in the winter months because it is much larger than the 86 to 260 MWh that will be produced on average by the associated generating facility on a winter day. Therefore, with DESC's stated rate, DESC would be overpaying for size and ability to shift energy because the battery will be underutilized.

In both cases, the actual energy-shift value can only be accurately assessed by a production cost model with both current and accurate information about the proposed resource and DESC's system. However, since the Tariff provides stated rates available to all eligible batteries, DESC had to implement an appropriate size ratio to help ensure benefits are reasonable commensurate with costs. At some level higher than the 25% size limit in the Tariff, the Storage QF will be underutilized as compared to the stated rate calculation in the Tariff. As explained above, this is due to the Storage QF's limitations and limited charging energy available. The ratio required in the Tariff (i.e., 60 MWh of storage on a 60 MW solar-generating facility) keeps the cost to customers aligned with the Storage QF's utilization and value to the DESC system. The ratio requirement seeks to prevent payment for an asset that is largely idle on a significant percentage of days.

Q. SHOULD DESC PROVIDE FOR A BROADER RANGE OF STORAGE SIZES IN THIS TARIFF?

A. No, because the Tariff provides standard offer rates that do not account for individual Storage QF characteristics—which, as I will explain below, are multiple. Therefore, DESC had to provide a size range within which DESC believes it will have projects that meet the assumptions in the models that were used to develop the Tariff's stated, fixed rates.

First, the 95% efficiency rate used in the PROSYM model is on the high-end of efficiency based on available data, and, thus, provides an assumption that benefits the Storage QF. Many systems are being specified with 85% to 90% efficiencies, and the Tariff provides for avoided costs above these levels of efficiency. Additionally, the Tariff must be limited because, in reality, the DC capacity of the physical battery installation will be built above the AC specification to maintain the minimum specification when accounting for normal battery degradation and inverter losses. The DC to AC inverters will almost never be constructed with a physical capability exactly at the project's AC specification and are limited to the interconnection requirements by controls programming. In practice, a range of projects can already meet the Tariff's exact requirements. Also, although DESC acknowledges that a storage project slightly larger than the 25% limitation in the Tariff will have a similar value, individually evaluating the value of such a project with the Avoided Cost Methodology will provide similar calculated avoided costs, but will more accurately value other significantly different aspects in association with the DESC system or the linked renewable generator. With consideration for an almost infinite number of permutations of specifications like AC solar output, AC storage capacity, solar DC to AC ratios, various solar design configurations (such as trackers and fixed-tilt), DC to DC storage, DC to AC to DC storage, efficiencies, and energy storage capability, DESC would be able to develop more accurate avoided cost rates and better protect customers by performing these studies on a case-by-case basis for such projects.

As DESC Witness Kassis explains in his testimony, DESC will continue to negotiate in good faith with storage projects that are ineligible for the Tariff. However, limiting the Tariff and providing accurate avoided costs for eligible projects is more practical than providing broader ranges because the number of proposed projects eligible for the Tariff will be properly limited. Indeed, it is more difficult to ensure accuracy and fairness of stated, fixed rates when applying those rates to a broad range of possibilities that may never even be proposed. After studying a project with the approved methodology, DESC will offer fair and accurate avoided cost rates to a proposed project regardless of whether (i) its capacity is 5 MW-AC or larger, (ii) its storage capability is shorter or longer than four hours, or (iii) its capacity in MW-AC is less than or equal to 25% of the capacity of the Generating QF.

Q. PLEASE EXPLAIN THE ACTUAL VALUE TO THE DESC SYSTEM OF ENERGY-SHIFTING IN THE SUMMER MONTHS.

A. The value and impact of storage must be evaluated in the specific system for which it is being used. Before solar generation supplied energy to DESC, the highest fuel costs and avoided cost hours were typically from 2 P.M. to 6 P.M. in the summer months. Now that existing solar QF power purchase agreements can supply over 600 MW in those hours, the higher marginal fuel costs can arise in the evening hours. In a typical summer storage scenario, a generating unit owned by DESC may be ramped up slightly in the afternoon hours to replace the solar energy used to charge the Storage QF. However, this stored energy will be discharged a few hours later to avoid dispatching a higher-cost generator in the evening of the same day resulting in a net-savings. On the DESC system, summer days typically have a relatively flat cost profile during daylight hours, and the savings for DESC's customers from utilizing storage with this cost profile could often be limited to a few dollars per MWh, less efficiency losses. The Storage QF would be highly utilized but the savings on a per MWh basis is limited. Much less frequently, extremely hot weather can help create higher cost differentials that add to the value of storage.

Q. PLEASE EXPLAIN THE ACTUAL VALUE TO THE DESC SYSTEM OF ENERGY-SHIFTING IN THE WINTER MONTHS.

A. In the winter, most of the solar production on the DESC system could be shifted by storing energy during the day when loads are low and discharging that energy to the grid in peak times in the morning hours before sunrise and sometimes in the evening just after dark. Given that solar generators produce only during daylight hours when loads are low, they produce mostly when marginal costs are low. The marginal costs and loads can be much higher in the morning and the evening when the sun is not shining, and the solar generators are not producing. However, the Storage QF can shift energy from mid-day to the higher-value times. It is important to note that energy for charging is limited to output from the Generating QF. In the winter, the days are shorter, and less sunlight is available, which results in decreased output and less value from Storage QFs. Sometimes, while the cost differential can be large, because a more limited amount of energy is available, the result is a moderate value that is only slightly larger than what is realized in the summer months. Because of a much wider range of customer use profiles in the winter and limited daylight, no energy should be discharged on some days in preparation for days with higher peak and much more energy-shifting value. The winter months in South Carolina involve a wide range of weather conditions, and energy-shifting value will be derived from optimizing charge and discharge times instead of using inflexible and arbitrary discharge time-of-day schedules.

Q. COULD THE TARIFF AND THE FACILITIES INTERCONNECTED UNDER THIS TARIFF ASSIST IN THE INTEGRATION OF NEW AND EXISTING SOLAR FACILITIES?

A. Yes. Both rates in the Tariff compensate the Storage QF for the generating-resource characteristics that can mitigate the integration costs of variable energy resources on the DESC system. Energy storage can react quickly and fill unplanned and sudden shortfalls in energy supply. The ramping capability, although situational, is not limited to the discharge capacity. Instead a 15 MW battery in charging mode can offset 15 MW of downward ramp from another resource by ceasing to charge. It can then provide another 15 MW of ramp by discharging at full output. Such a facility would provide 15 MW of capacity toward applicable reserve requirements but has contributed 30 MW of ramp to balance the system. The Storage QF could also continue to generate for several hours, depending upon the state of charge, in the event of an unplanned and persistent reduction in utility-scale solar generation on the DESC system. Because of the basis of the capacity and energy-shifting rate in the Tariff, compensation is provided for a resource with some of the key attributes of a combustion turbine, which include ramping, quick-start ability, and firm capacity, which are all useful in system operations that include variable energy resources.

Q. CAN A STORAGE QF REDUCE INTEGRATION COSTS?

A. Yes. Assuming such a resource is dispatched appropriately, any firm quick-starting resource with an acceptable energy delivery duration that provides flexible reserves without additional fuel costs in the standby condition will reduce the cost of supplying the additional reserves needed to back up intermittent generation resources. In fact, the energy-shifting avoided cost calculation includes cost benefits from providing reserves including the additional reserves due to solar generation intermittency at a lower cost than the DESC system without the battery. However, it is important to note that if storage is not properly optimized in system operations, it may result in additional integration costs.

Q. YOU DESCRIBED ABOVE HOW DESC'S DISPATCH SIGNALS TO THE STORAGE QF IMPACTS THE STORAGE QF CAPACITY RATE, BUT DO THEY ALSO IMPACT THE STORAGE QF ENERGY-SHIFTING RATE?

A. Certainly. DESC's ability to provide dispatch signals to the Storage QF directly impacts the overall optimization—a more cost-effective utilization—of the Storage QF and thus the ultimate benefit to DESC's customers. DESC assumed a Storage QF's ability to comply with dispatch signals in order to receive the full avoided capacity rate. In the production model where the value of energy-shifting is calculated, the storage facility is modelled just as if it is responding to DESC's dispatch signals. This results in a higher value for DESC's customers than would be achieved if the project owner followed a pre-planned schedule for the dispatch of the Storage QF.

Q. EVEN WITH THESE SPECIAL PROVISIONS IN THE TARIFF, IS IT DIFFICULT TO PROVIDE A STANDARD OFFER FOR STORAGE QFS?

A. Yes. There are many internal and external factors that impact the value of storage on the DESC system. Storage QFs are typically highly efficient and, when dispatched in accordance with DESC's signals, could help meet peak needs. However, as previously discussed, the potential value of this shift is low much of the time due to similar costs between utility-owned generators in this time of low fuel prices, and is further limited by the Storage QF's ability to only charge during the day since it is paired with a single solar generator.

For systems like DESC's, which have a significant amount of QFs—DESC projects that interconnected utility-scale solar will approach 973 MW based on executed PPAs—light-load periods from October through April present an obvious opportunity to utilize Storage QFs. Yet, even during these periods it is clear there are limitations to the benefits of Storage QFs. For example, during this time of light load, DESC has certain generation minimum run requirements to maintain system reliability. These minimum run requirements can result in curtailment of variable generating resources, such as solar. The ability of Storage QFs to help address periods of curtailment provides an extreme example of how value is realized. The incremental value of energy during curtailment hours is zero, so shifting that energy to any other time of need produces a 100% benefit. These occurrences are expected to represent less than 5% of all hours. This means the contribution to energy-shifting value during curtailment hours has a large magnitude, but those occurrences are limited and therefore do not have a large impact on total avoided cost. Similarly, energy-shifting from sunny afternoons in the winter to extremely cold winter mornings has a higher value, but these occurrences are also limited as a function of the weather. Also consider that, even before the addition of the first Storage QF, DESC is already able to energy-shift 3,960 MWh through Fairfield. Almost any modern battery would be more efficient than the 71% efficient pumped storage, but the gain to the system is incremental in capacity, storage, and efficiency. This limited gain for the overall system is reflected in the avoided cost calculation and Tariff rates.

Therefore, in order to protect DESC's customers, particularly since there are so many factors, including, but not limited to, those discussed above, impacting the benefits of energy storage to those customers, the costs and benefits should be studied and quantified in tranches of storage because each additional increment has less effect. As Storage QFs approach that threshold, DESC must re-study the proposed facilities to provide an accurate rate that reflects the incremental value of the next tranche.

Q. WHAT IS THE RISK OF MAINTAINING A STANDARD OFFER TARIFF WITH ESTABLISHED RATES WITHOUT AN INITIAL 100 MW CAP?

A. As is true for any resource and for all avoided cost calculations, a second resource added to a similar first resource will result in a lower avoided cost than was calculated for the first. Similarly, holding all else the same, a second 100 MW purchase schedule will result in a lower avoided cost than the previous 100 MW purchase schedule. This is not a construct of the avoided cost methodology, rather, the second resource actually provides less value to DESC's system with all other conditions held constant. This is because a second resource with the same attributes will displace different and less costly system resources in the same time period than the first. DESC considers 100 MW of additional storage large enough to warrant another evaluation to protect its customers and that is consistent with avoided cost guidance in PURPA.

Q. PLEASE EXPLAIN HOW DESC PLANS FOR AND OPTIMIZES THE DISPATCH OF ITS SYSTEM.

A. As a preliminary matter, I will explain how the Economic Resource Commitment ("ERC") group at DESC, which I manage, develops a plan (intraday, next day, and 16 days into the future) to maximize the value of these resources. DESC Witness Hanzlik explains in greater detail in his testimony how DESC executes this plan and alters the dispatch of these resources in real-time.

As for the ERC, it starts with an hourly weather forecast and ends with an hourly dispatch plan for all DESC generation resources and bulk energy transactions. ERC and Operations Planning use an hourly weather forecast for the next 2 weeks and historical data to determine a 16-day hourly Balancing Authority Area ("BAA") load forecast. This weather forecast contains hourly temperature, other weather parameters, and solar irradiance for 5 weather stations in the BAA and, along with calendar and time of day factors, is the most significant input for the load forecast and solar generation forecast. In addition to this hourly load and solar generation forecast, generating unit status, generating unit engineering parameters, and fuel cost estimates are provided to a production cost optimization model for study. This model plans the dispatch of system generation and contract resources to balance hourly generation with system loads and sales in a low-cost optimization that also provides for reliability requirements.

This dispatch plan, once adjusted for transmission constraints and additional resources for reserves and system balancing, is provided to System Control for use in real-time operations. This constrained unit commitment plan is known as the Balancing Integrated Operational Plan ("BIOP") and provides a unit commitment, dispatch, and reserve plans for the next 16 days. It includes expectations for load, thermal units, solar generators, pumped storage, and any other bulk resources and deliveries by hour. The BIOP also includes the energy storage plans for pumped storage, which include levels for pumping, generating, and energy storage. In the execution of the BIOP by the System Controller, actual operation of the resources will vary as actual conditions warrant, but each variation should also reflect the next most cost-effective choice of resources that have the needed generator attributes.

Q. WILL STORAGE QFs BE PLANNED AND MODELLED JUST AS DESC PLANS AND MODELS THE DISPATCH OF ITS SYSTEM, AS YOU DESCRIBED ABOVE?

A. Yes. As I mentioned previously, there are similarities between Storage QFs and Fairfield. DESC will account for the specific characteristics of these facilities and will combine these with the generating forecast, generating unit status, generating unit engineering parameters of other generation assets in the cost-optimization model. The ERC plans and models the dispatch of system generation and contract resources in a low-cost optimization that also provides for reliability requirements. Just as with DESC's own resources, the charge and discharge signals provided to Storage QFs in real-time will vary from projections in the BIOP in order to address actual system needs.

Q. IF STORAGE QFS DID NOT RESPOND TO DESC'S ELECTRONIC DISPATCH SIGNALS, WOULD VALUES PROVIDED IN THE TARIFF REMAIN FAIR?

A. No. As discussed above, DESC assumed a high optimization rate and provides a stated fixed rate that DESC will pay to Storage QFs based upon this high optimization rate. DESC will pay these Storage QFs a higher rate based upon the assumption that DESC can achieve a high dispatch optimization rate. That is why the Tariff states that the PPA will contain additional details about the Storage QF's compliance with DESC's dispatch instructions.

Q. DID DESC CONSIDER A TECHNOLOGY-NEUTRAL TIME OF PRODUCTION RATE SCHEME?

A. DESC considered a technology-neutral Time of Production ("TOP") rate scheme, but applying that methodology to an energy-limited resource reduces value. To arrive at a TOP rate, the avoided cost methodology studies the cost reduction (avoided cost) in each time period (varies similar hourly groups that change by month/season and day of week) due to a 100 MWh energy purchase distributed equally in every hour of the day and every day of the year. Instead of having this very high capacity factor, the solar QF has a capacity factor closer to 25% and cannot practically replicate the distribution of the avoided cost purchase. An energy-limited intermittent and variable resource tied to an energy-limited Storage QF will never distribute energy to the grid like the constant resource in the study, and it will have different value. In fact, once the TOP energy rate schedule is set via an avoided cost study, the production schedule of the Storage QF could be modeled to maximize revenue. The resulting production schedule could then be studied for level of capacity contribution in peak winter hours or capacity could be paid on peak period performance each year as a proxy for avoided capacity costs. Either way, paying strictly by TOP gives the same value to energy at 7:00 A.M. on every January morning, whether the temperature is 10, 20, 30, 40 or 50 °F. A better approach is to assume a high level of efficiency, which benefits the Storage QF, and require the Storage QF to follow the real-time dispatch signals. Since a mild 40 °F morning could be followed by a cloudy day and a 20 °F morning, the stored energy should be held back for the higher peak creating maximum benefit. In summary, the Tariff achieves a balance by taking revenue risk off the Storage QF while also preserving the ability for DESC's customers to realize the maximum benefit from Storage QFs.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.